Chapter 3: Participation of Small-Scale Farmers in the Production of Non-Traditional Agricultural Exports

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Introduction

Many Latin American countries have shifted their development strategies from import substitute industrialization to export-led development in the period between the 1970s and 90s. Under this strategy, it became important to decrease dependency on traditional export products such as minerals and traditional agricultural export products, and to diversify export products.

Some countries started to diversify their agricultural exports from traditional products like bananas, coffee, cotton and sugar, to new products such as fresh fruits and vegetables, flowers, seasoning, natural colorant, etc. These products are called non-traditional agricultural exports (NTAEs). The examples are: Chilean fresh fruits, Colombian cut flowers, fresh fruits and vegetables from Mexico, Central America and the Caribbean. In the case of Chilean grapes, exports have grown from US$1.3 million in 1961 to US$ 4.0 million in 1970, US$ 51.8 million in 1980, US$ 352.8 in 1990 and US$605.2 million in 1999. The export of Colombian flowers also expanded significantly, from US$ 976,000 in 1970 to US$97 million in 1980, US$ 229 million in 1990 and US$ 556.2 million in 1998[48].

There are many reasons for the increase of NTAEs. Some factors are comparative advantages of Latin America in the production of these agricultural products, such as climate and cheap labor. The climate of Central Valley in Chile is similar to that of California. Since it is located in the Southern Hemisphere, Chile can produce fruits during the season in which the producers in the Northern Hemisphere cannot produce. In the case of Colombian flowers, a temperate climate and many hours of sunlight around Bogota favor flower production all through the year. In addition, fruits, vegetables and flowers are very labor intensive products, and cheap labor in Latin American countries helps to keep production costs low compared with the United States and Europe.

These comparative advantages were combined with development of transportation and distribution system in order to make the exports possible. Air traffic between countries of origin and markets increased. Development of cold storage permits fresh produce to be kept refrigerated from the moment of harvest until the products reach the final consumers. New packing technology also contributed to prolonging the life of perishable products.

Furthermore, change in consumer preference is one of the factors behind the expansion of NTAEs. Consumers with high income levels demand fresh products all through the year. They are willing to pay more if those products are available during the off-season. Also, many high-income consumers are seeking exotic produce that was unknown to them before.

It is clear that NTAEs have increased in many Latin American countries. However, it is not clear whether small-scale producers, especially traditional family farmers, can participate in the production of NTAEs and receive their fair share of benefit. Some

[48] Data for Chile is from FAOSTAT (http://apps.fao.org/) and that for Colombia is ASOCOLFLORES (http://www.colombianflowers.com/).

existing studies argue that small-scale farmers can participate in the production through contract farming. Others demonstrate that production of capital intensive NTAEs is difficult for small-scale farmers.

The purpose of this study is to analyze whether small-scale farmers can participate in the production of NTAEs in Peru. First, existing studies on NTAEs and participation by small-scale producers are examined. Second, studies on small-scale farmers in Peru are presented to explain the current situation in Peru. Third, the result of a study on white asparagus production, one of the most important NTAEs from Peru, will be presented. The author conducted interviews with various types of asparagus producers in the northern coastal part of Peru. Finally, these studies are analyzed to examine the participation of small-scale farmers in NTAEs production.

Participation by small-scale farmers

Knowing the comparative advantages of Latin American countries in the production of NTAE crops, and growing demand for them in developed countries, multinational companies as well as national agro-industry and exporting firms became interested in producing these products. In this paper, the term "agro-industry firms" is used for all kinds of multinational and national companies that produce, process and export agricultural produce.

Theoretically, these firms have three ways to obtain raw material: purchasing on spot markets, purchasing through contract farming (vertical coordination) and producing within their own farms (vertical integration). Compared with traditional crops such as maize, potato, etc., NTAE crops are very demanding in terms of capital and technology. Only firms have enough capital to initiate production and link with markets in developed countries. However, many of these companies were reluctant to invest in production because of restrictions on agricultural markets. For example, corporations were prohibited from purchasing land; access to water was not guaranteed by law. Foreign companies were afraid of labor disputes. These factors prevented multinational companies and agro-industry firms from starting production of NTAE crops by themselves. The question was then: from where they could obtain materials so that they could process them and export them to markets in developed countries?

While firms were reluctant to produce NTAE crops by themselves, many small-scale family farmers had a difficult time producing basic crops. With the liberalization of the economy, many Latin American countries abandoned import restrictions and reduced tariff rates. This allowed cheap foreign crops such as corn and wheat to flow into domestic markets. Liberalization of trade lowered the prices of many agricultural products. Therefore, less efficient small-scale producers were not able to compete with imported crops. They needed crops that were more profitable, and high value NTAE crops attracted their attention.

Contract farming and factor markets

Under these circumstances, contract farming is considered as a solution for both agro-industry firms and small-scale farmers. The basic idea of contract farming is that the firms provide resources for farmers and farmers sell their harvest to the firms. Through contracts,

farmers can obtain necessary working capital and stable markets in which to sell their products, and firms can obtain raw materials in a more stable way than through a spot market.

According to Key and Rusten (1999), there are three types of contract between firms and farmers. The first is the purchasing contract; processing and exporting companies agree to purchase crops from farmers before the harvest. They agree on the types of crops the companies will purchase, price, quantity, quality, and date of delivery. Secondly, firms provide input, technology and sometimes working capital to the farmers from whom they purchase crops. The cost of inputs, credit and so on, will be deducted from sales of crops. Thirdly, firms control production by giving specific instructions such as the timing of seeding and application of fertilizers and chemicals. This is in order to control quality and harvest time of crops. Small-scale family farmers need the second or the third type of contract in order to participate in the production of high-value NTAE crops.

In order to better understand contract farming, it is necessary to understand the production factor markets in which small-scale farmers and firms operate and interact. If there were perfect markets for credit, insurance, labor, land, input and harvested crops, it would not be necessary to operate under contract. Even small-scale family farmers would be able to acquire the necessary capital and technology through the market at reasonable cost, and sell their crops through the market. However, in reality, markets for all goods often do not exist in rural areas. Depending on the characteristics of each market, contract farming can often be attractive and beneficial for small-scale farmers. The study by Key and Rusten (1999) analyzed the theory of each market in detail, and is briefly resumed below.

Credit

It is very difficult for small-scale farmers to obtain credit from commercial banks. Problems are: farmers often do not have formal property rights to provide collateral for a loan; small properties do not have enough collateral value for credit; loan periods are very short, etc. In addition, banks are reluctant to lend to farmers because many farmers are accustomed to having their debts forgiven by state banks, and there is a high degree of uncertainty. If agro-industry firms are the only sources of credit for small-scale farmers, they will borrow money from the firms even though the interest rate is high. In other words, firms have an incentive to contract with them and provide loans at high interest rates despite the high risk of losing their loan. Undeveloped credit markets in rural area work in favor of contract farming.

Insurance

A study by Binswanger and Rosenzweig (1986) gives the reasons why there is no insurance market for agricultural production except one for general crops subsidized by governments. One reason is asymmetric information between producers and insurance companies and the high cost of filling the gap. The other reason is moral hazard: producers may not look after crops so much when they are insured. Information on crops and producers is not very difficult to obtain at a village level, however insurance cannot be offered at a village level because of the probability of bad harvests in certain geographical areas, and insurance cannot cover all claims if the policyholders are all in the same area.

Contracts offered by companies sometimes work like insurance for farmers. Because companies can contract with many farmers from geographically dispersed areas, they can diversify risks associated with climate, plague, etc. From the farmers' point of view, contract prices protect them from market price fluctuations. Small-scale farmers who cannot afford to lose are more risk averse than large-scale farmers and they are willing to accept low guaranteed prices in order to reduce their risks. Therefore, companies have an incentive to contract with small-scale farmers.

Information and transactions

When transferring technology to farmers, it costs less for firms to contract with a small number of large-scale farmers than with a large number of small-scale farmers. Large farmers are relatively well educated, have some knowledge and equipment and understand better the instructions given by firms. On the other hand, small farmers are generally less educated, do not own equipment, which firms therefore have to provide. If firms have to visit farmers in order to give technical assistance and monitoring, it costs less to visit large farmers. For each contract, there is a fixed administration cost regardless of the size of the contract, therefore larger contracts cost less per unit of sales than small contracts, unless small farmers organize themselves and contract as a group.

Labor

For various cultural or social reasons, excess family labor might not be available in an open labor market. In this case, firms cannot hire them for their own operations, but buy crops in an open market or through contracts. In the case of labor intensive crops, small farmers have the advantage of utilizing abundant family labor whose opportunity cost is very low.
In addition, hired labor sometimes has a so-called incentive problem. In the production of many NTAE crops, the quality of the produce greatly affects its price. Since produce quality does not usually reflect the wages of hired laborers, they do not have an incentive to work harder. In order to keep produce quality high with hired laborers, costly labor monitoring is necessary. Without monitoring, they might cheat and produce quality will deteriorate. On the other hand, family laborers often do not have this incentive problem because their income will be directly affected by the quality of labor they offer.

Criticism of contract farming

According to the analysis above, the agricultural markets in rural sectors favor the participation of small-scale farmers in production of NTAE crops through contract farming except for information and transaction. In order to fill the information gap and reduce the cost of transactions between agro-industry firms and small-scale farmers, international aid agencies such as United States Agency for International Development (USAID) started NTAE development projects in Latin American countries, especially in the Central America and Caribbean region. For example, between 1985 to 1992, the agency spent US$ 1.53 million on an export promotion project called PROEXAG. It supported an agro-export diversification project in Honduras (PRODIVERSA), an NTAE project in Ecuador

(PROEXANT), etc. As a result, NTAEs from Central America had increased from US$ 4.5 million in 1975 to US$ 250 million in 1990 (Conroy, Murray and Rosset, 1996).

These projects aimed at promoting the participation of small-scale farmers in the production of NTAEs, however, many of them became subjects of criticism. Studies by Murray (1994), Conroy, Murray and Rosset (1996), Trupp (1995), etc. revealed problems of participation of small-scale farmers in these projects. They point out two major problems. One is that many small-scale farmers were not capable of managing production of NTAE crops that involve high cost and high risk. These crops are very different from traditional crops like maize or potato. They are vulnerable to plagues and are highly perishable. Deterioration of quality significantly reduces the value of crops. The farmers were not ready to deal with these kinds of crops.

The other problem is unequal negotiating power between firms and farmers. When a new crop is introduced in the area, a firm first offers favorable terms of contract to farmers because they are the only suppliers of material for its processing plant. It is important to obtain enough material to keep the plant operating. However, as the number of suppliers increases, the firm's negotiating power increases against farmers. The farmers whose only client is the firm do not have a choice but to accept terms favorable to the firm. Although the contract farming system appears to be beneficial for both firms and farmers in theory, it is not so in practice because of asymmetry between them. Firms have more capital and access to market information and thus more negotiating power over small farmers.

Conditions for the participation of small-scale farmers

Analyzing case studies from eight countries in Latin America, Schejtman (1998) determines specific socio-economic characteristics that are suited for contract farming for small-scale farmers. First, crops with the characteristics below would be favorable for small-scale farmers:

There are diseconomies of scale in production such as high labor monitoring costs;
Utilization of family labor with low opportunity cost;
Low production cost per unit weight of crops or per area cultivated for production;
Perishable and it is difficult for firms to purchase in an open market;
Possibility of adding values in post-harvest process;
Retrieval of cost in short period;
Growing demand with possible ties with production chain.

Besides these crop characteristics, there are other conditions that can facilitate ties between agro-industry firms and small-scale farmers. They are:

- Tight markets for land and labor;
- The existence of subsidized programs for small-scale producers;
- The existence of organizations that can act as intermediaries between firms and producers.

Schejtman argues that in order these conditions to be developed, public institutions need to intervene in several of the aspects listed the below:

Securing profitable market first;
Providing technical assistance and training;
Securing finance for production and processing;
Organizing farmers to reduce transaction cost;

Sharing risk among firms and farmers;
Removing information asymmetry to avoid mismanagement of crops;
Establishing a system of arbitration in case disagreement arises between farmers and agro-industries.

Participation of small-scale farmers in the production of NTAE crops depends on various market conditions. The next section describes the current situation of small-scale producers in Peruvian coastal areas in relation to the production of export crops and the relationship between small-scale farmers and agro-industry firms.

Small-scale farmers and NTAEs in Peru

The factors that have hindered modernization of agriculture and development of NTAEs in Peru can be attributed to the agricultural reforms during the military government at the end of the 1960s and the first part of the 1970s, and the import substitution industrialization policy carried on until the end of the 1980s. After the agricultural reforms, large farms were eventually divided into small parcels, and farmers with little experience in management took control of production. As a result, the productivity of the land reduced. In addition, the import substitution policy was biased against the agricultural sector, creating disincentives for agro-exports and incentives for food imports.
The stabilization and liberalization of economy in the 1990s built a foundation for the growth of NTAEs. In Peru, all agricultural exports other than traditional products (coffee, sugar cane, cotton and wool) are classified as NTAEs. Their share of agro-exports was around 20% in the 1980s. This figure increased significantly in the first half of 1990s, reaching to 74% in 1993, and stayed between 45 to 60% thereafter (Table 1). Still, compared with other countries in Latin America, the export value is small. For example, in 1998, Chile exported US$ 403 million worth of fresh grapes. Exports of Colombian cut flowers were US$ 556 million. On the other hand, the export value of preserved (canned or bottled) asparagus, which is the No. 1 NTAE in Peru, is US$ 78 million. Added to fresh and frozen products, the value reaches US$ 128 million. In this section, a few case studies on small-scale farmers are analyzed in order to examine the possibility of the their participation in production for agro-export and agro-industry.

Table 1 Agro-export of Peru (US$1000)

	traditional	non-traditional	total	share of non-traditional
1950	107160	586	107746	0.54%
1960	146094	2213	148307	1.49%
1970	161482	5766	167248	3.45%
1980	260368	48789	309157	15.78%
1990	195622	109397	305019	35.87%
1995	340912	316145	657057	48.12%
1999	275395	451602	726997	62.12%

Source: Oficina de Informacion Agraria, Ministerio de Agricultura (http://www.minag.gob.pe/)

Case studies on small-scale production

Figueroa (1995) studied links between agro-industry firms and small-scale farmers in the department of Ica, situated on the coast south of Lima. Farmers may be related to firms as suppliers of raw materials, as providers of agricultural land and as the labor force.

In this area, cotton and grapes for wine and liquor have been cultivated traditionally. In the middle of the 1980s, asparagus and tomatoes were introduced by medium and large-scale farmers and agro-industry firms, but not by small-scale farmers. The author examined the characteristics of the four crops (asparagus, tomatoes, cotton and grapes). Among the crops studied, asparagus and grapes for wine are the most capital intensive, followed by tomatoes, cotton and grapes of Creole variety for liquor. The main reason why small-scale farmers are not able to participate in the production of crops for agro-industry is that they lack the necessary capital for production.

Small-scale farmers participated in the production of crops for agro-industry as hired laborers. Through this activity, they learned new technology for irrigation and the use of fertilizers, which can be applied to production in their own fields. However, the improvement in efficiency is limited because the cost of inputs used in the new technology is high, and small-scale farmers cannot afford them. Only some practices, such as improvement of water management, are adapted. In a few cases, those farmers started to produce asparagus with little capital. This might be adapted by more small-scale farmers, but it would take long time.

For the modernization of small-scale farmers, the author suggests not the introduction of new crops, but an improvement of existing crops, which would be widely accepted and would yield better result. The success of barley production in Cusco for the beer industry was because the crop was traditionally cultivated in the area, and cultivation technology was not very different. The improvement required was mainly in harvesting such as choosing right harvest time and not mixing with other crops, etc. In the case of Ica, the improvement of cotton and grapes would be more profitable for small-scale farmers, though it has not proved to be so over the past ten years.

Fort (1999) studied the production of beans for export in Piura, the northern coastal department of Peru. In this area, several agro-industry firms offer contracts to farmers to produce beans (palo verde, castilla) for them. Some firms directly contract with farmers, providing seeds and technical assistance. Other firms contract with producers through NGOs that coordinate credit and provide technical assistance for production. The author concludes that the participation of NGOs and producers' associations in contract farming can make production by small-scale farmers more successful because these organizations help reduce transaction cost between producers and firms.

Procesadora S.A. is the largest exporter of beans in Peru, and one of the companies that obtain raw material from small-scale farmers in the area[49]. When the company found a large and stable client in the U.S. market at the beginning of the 1990s, they expanded their beans operation. Today, it buys raw materials from 1500 farmers, directly and through NGOs and producers' associations. The contracts make it possible for the firm to obtain

[49] Based on interviews with company personnel (Alfonso Velásquez on Nov. 17, and Ruben Rios on Dec. 4, 2000)

raw material continuously for its processing plant. In the contract, the firm offers certified seeds, fertilizer, insecticide, technical assistance and agricultural machinery. In many cases, NGOs arrange loans for producers with commercial banks and provide technical assistance. During production, the firm's agronomists visit the fields to monitor production. In the contract, the firm guarantees a minimum purchase price, and offers more when the market price at harvest is higher than that price. Currently, the firm is working with more than 10 NGOs, and this helps to stabilize the supply of raw material.

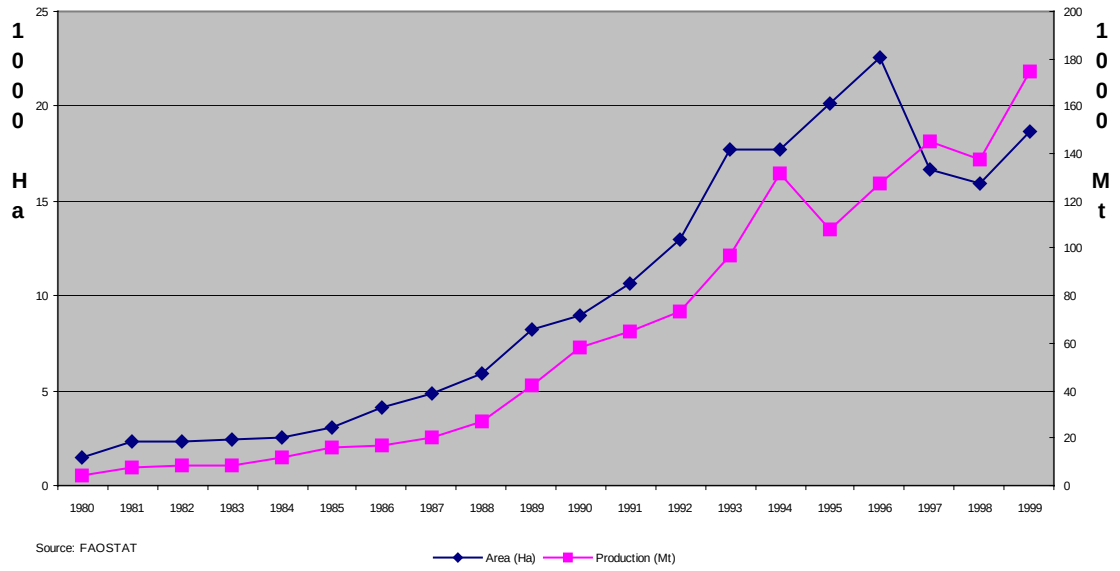
The participation of small-scale farmers in the production of NTAEs is still very small, though there are some cases as described in the studies above. In the next section, I will discuss the production of asparagus in Peru in detail.

Asparagus production

General characteristics

Asparagus is one of the most important agricultural products for export in Peru. In 1998, Peru exported US$ 77.8 million of preserved asparagus, US$ 35.7 million of fresh asparagus and US$ 14.7 million of frozen asparagus[50]. Their respective shares of agro-exports are 10.82%, 4.97% and 2.05%, and they were ranked as the second, the fourth and the eighth in the list of agro-export products. Production increased from 4,428 metric tons (Mt) on 1,512 hectare (Ha) of land in 1980 to 174,863 Mt on 18,653 Ha in 1999 (Figure 1).

Figure 1 Asparagus production in Peru



[50] Preliminary figures for 1999 is US$87.3 million of conserved asparagus and US$47.2 million of fresh asparagus. For 2000, the figures are US$79.9 million for conserved asparagus and US$53.4 million for fresh and frozen asparagus.

In general, there are two types of asparagus: white and green. White asparagus is mainly processed for canning and bottling, and most Peruvian white asparagus is exported to the European market, with Spain as the number one destination. Green asparagus is mainly exported as fresh produce to the U.S. market. It is also exported frozen.

According to the asparagus census taken by the Ministry of Agriculture in 1998[51], asparagus is produced on a total area of 17,552 Ha in 34 valleys in the coastal area of Peru (Figure 2). The department of Ica has the largest area of asparagus production, 45% of national total, followed by La Libertad (30%) and Lima (16%). 58% of the area is used for white asparagus, half of which is located in La Libertad, and 42% is used for green asparagus, mainly located in Ica. In 1998, 101,900 Mt of asparagus, of which 56% was white asparagus and 44% was green asparagus[52], was harvested from 13,874 Ha of land.

Figure 2 Major production areas of asparagus in Peru

[51] Ministerio de Agricultura, Oficina de Información Agraia (1999).
[52] IICA Centro Regional Andino (2000).

In Peru, white asparagus was first introduced in the 1950s in the northern coastal area of Virú valley, in the department of La Libertad. Production increased significantly after the 1980s as the price of asparagus went up in the international market when Taiwan, the principal producer at that time, withdrew from production[53]. In La Libertad, the area of production increased from 752 Ha in 1980 to 8,249 Ha in 1992. Small-scale farmers were the main producers of the crop. During 1980-85, 70% of the producers in Virú-Chao, two major valleys in the department, farmed less than 10 Ha. However, the structure of production is changing with the completion of one of the country's largest irrigation projects called CHAVIMOCHIC[54]. According to the 1998 asparagus census, in La Libertad small-scale farmers (less than 10 Ha) represent 80% in number and 41% of the area given over to asparagus cultivation. Large-scale producers (more than 50 Ha), many of which are corporations, represent 2% in number and 35% of the area. Although, large numbers of small producers are still cultivating white asparagus in the area, small number of large corporations are rapidly increasing production.

Green asparagus was introduced for export as fresh produce only in the second half of the 1980s. In 1987, a group of farmers in the department of Ica established the Asparagus Producers Association of Ica (Asociación de Productores de Espárragos de Ica: APEI) with support from the USAID. It was founded to produce, process and export fresh green asparagus for the U.S. market. The association first started to produce asparagus on 13 Ha, and the operation had expanded to 1,118 Ha by 1992[55]. The data from asparagus census shows that in Ica department, small-scale farmers represent 14% of the total number and 13% of the area under cultivation of asparagus while large-scale producers represent 46% of the total number and 50% of the area.

In summary, then, it can be said that in Peru white asparagus is produced by a large number of small producers and a small number of large producers in La Libertad, while green asparagus is produced by medium and large producers in Ica and Lima (See Table 2).

Table 2 National share of asparagus production in Ica and La Libertad

		Ica		La Libertad	
		white	green	white	green
Number of unit	small (-10ha)	0.32%	10.75%	49.24%	0.30%
	medium (10-50Ha)	2.27%	24.18%	11.12%	0.00%
	large (50Ha-)	3.08%	29.85%	1.35%	0.60%
	total	5.67%	64.78%	61.72%	0.90%
Area	small (-10ha)	0.29%	1.59%	21.28%	0.03%
	medium (10-50Ha)	7.25%	17.56%	12.53%	0.00%
	large (50Ha-)	19.56%	50.86%	17.26%	1.16%
	total	27.10%	70.00%	51.07%	1.19%

Source: Ministerio de Agricultura (1998). Elaborated by the author.

[53] Marañón (1993).

[54] CHAVIMOCHIC Special Project was initiated in 1967. The plan is to construct canal from Santa River, which has abundant water supply all through the year, to four valleys in the department of La Libertad: Chao, Virú, Moche and Chicama. To date, about 28000 Ha of agricultural land is newly created, out of which 20000 Ha was sold to private companies and individuals, and 9000 Ha is under production.

[55] Marañón (1993).

Cost, yield, price and profitability

According to FAO statistics, the yield of asparagus in Peru is one of the highest in the world. In 1999, the world average was 4,243 Kg/Ha, and Peru achieved 9,375Kg/Ha (per year), the world's highest, followed by the Philippines (8,333), Belgium-Luxembourg (7,500) and Italy (6,553)[56]. Mild temperatures and long hours of sunshine in the coastal area of Peru make it possible to harvest the crop twice a year.

Although productivity varies within Peru, depending on climate, soil, year of plants, etc., it would be helpful to analyze the production according to the size of the producers. Table 3 presents average cost, yield and farm-gate price of green and white asparagus classified by small (less than 10 Ha), medium (between 10 to 50 Ha) and large-scale (more than 50 Ha) producers. In case of white asparagus, the larger the producer, the higher the production cost, yield and farm-gate price. The resulting internal rate of return and present net value demonstrate that large-scale capital intensive production is much more profitable than small-scale production. However, the situation is a little different for green asparagus production. The production cost for large-scale producers is much more than that for medium-scale producers, but neither yield nor farm-gate price are very different in each case.

Table 3 Cost, yield and price of asparagus production

	cost (US$/Ha)		yield (Kg/Ha)		price (non-classified, US$/Kg)	
	initial	each harvest	white	green	white	green
small (-10ha)	3680	1325	6251	5582	0.45	0.68
medium (10-50Ha)	4365	2056	6931	7978	0.56	0.97
large (50Ha-)	5195	2345	7578	7928	0.91	1.01

Source: IICA (2000)

Utilizing these data, IICA (2000) attempts to examine the profitability of asparagus production according to asparagus type (white or green) and producer size (small, medium or large). It calculates the internal rate of return and present net value of production per hectare. The results, presented in Table 4, shows that the larger the production, the higher the profitability. The net present values for white asparagus production by small and medium-scale producers are negative with an interest rate of 15%. In addition, green asparagus production is more profitable than white.

Table 4 Profitability of asparagus production

	Internal Rate of Return		Present Net Value (US$, interest rate 15%)	
	white	green	white	green

[56] FAOSTAT. The data for Poland is 20000, however, it seems like a mistake of data entry.

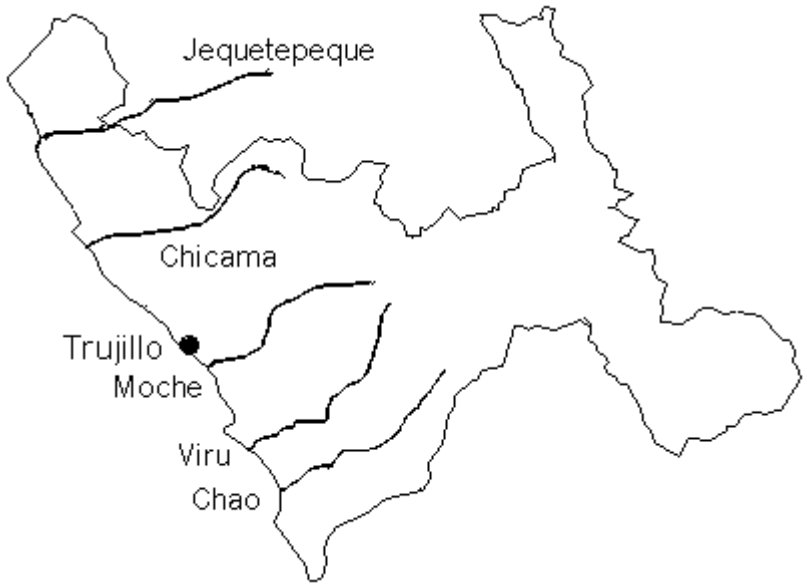
small (-10ha)	-7%	39%	-2396.52	4743.30
medium (10-50Ha)	-	58%	-4732.74	11520.96
large (50Ha-)	36%	59%	5240.88	11909.07

Source: IICA (2000)

Production in Northern Peru

In order to understand the production of asparagus, the author conducted field interviews with producers of asparagus over one week in the department of La Libertad. There are five major valleys in La Libertad: Chao, Virú, Moche, Chicama and Jequetepeque (Figure 3). The interviews were conducted with 12 producers in the first four valleys. Small, medium and large-scale producers are included so that they can be compared with each other.

Figure 3 Major valleys in the Department of La Libertad



The reason why La Libertad was chosen for the research is that the producers in that area are more heterogeneous compared with those in Ica. As described above, small-scale producers had been dominant in the area, but large-scale production started after the partial completion of the CHAVIMOCHIC project. According to a survey conducted by the local office of the Ministry of Agriculture in February 2000[57], out of 8,503 Ha of land used for asparagus production in the department, 43.96% is located in "valles viejos (old valleys)", the original agricultural land in the valleys where small-scale producers are dominant. On the other hand, 56.04% is located in the area of influence of the CHAVIMOCHIC project.

[57] Ministerio de Agricultura, Dirección Regional Agraria La Libertad, Oficina de Información Agraria (2000).

In this irrigation project, almost all producers hold more than 50 Ha, though the land is not in full production yet.

Classification criteria

According to the study by IICA (2000), asparagus producers can be classified into three groups: agricultural businesses, medium-scale farmers and traditional small-scale farmers (Table 5). Agricultural businesses are large-scale producers and they take the form of a company or partnership. The average size of the producers is 49 Ha, and are mainly located in Ica department. They have permanent technicians and professional consultants and utilize sophisticated irrigation systems with hired laborers. Their production yield is much higher than the average. They have access to credit from commercial banks and make large investments in facilities, machinery, inputs, etc. They are highly integrated into markets. Some of them have processing plants and export their produce by themselves. On the other hand, traditional small-scale producers have 2.24 Ha on average and are individual farmers in La Libertad department. They use traditional irrigation system and utilize family members for their labor force. Their production yield is low. They do not have access to credit from commercial banks, and investment in production is small. They often sell their produce to intermediaries. The medium-scale farms, with 10 Ha of land on average, have more heterogeneous characteristics than large or small-scale producers.
Table 5 Type of producers and their characteristics

Type of producers	Agricultural business	Medium-scale farmers	Traditional small-scale family farmers
Location (department)	Ica and La Libertad	Ica and La Libertad	La Libertad
average size	49 HA	10 HA	2.24 HA
Type of asparagus	Ica: green (fresh and frozen) La Libertad: white (conserved)	Green and some white	White (conserved)
Forms of producers	Businesses, partnerships	Individuals	Individuals
Education of producers	Tertiary	Tertiary or secondary	Secondary
Integration into market	High, some with own processing plants	Medium, some with contracts	Weak
Employment	Administrative and technical professionals and permanent hired manual laborers	Hired manual laborers	Family members and seasonal hired manual laborers
Participation in associations	High participation	Some participation	Low participation
Technology	High with very sophisticated irrigation	High with sophisticated irrigation	Low with simple irrigation

	system	system	system
Yield (white asparagus)	20-30 Mt/Ha	10-20 Mt/Ha	6-10 Mt/Ha
Credit	Access to formal credit	Some access to formal credit	No access to formal credit
Profitability (rate of return)	Strongly positive	Strongly positive for green, but negative for white	Negative

Drawn up from IICA (2000) and field interviews.

Types of producers studied

Based on the criteria described above, the producers interviewed in La Libertad department can be classified into four groups. Besides the scale of production, small-scale producers are divided into two groups: traditional family farmers and producers with help from NGOs. The characteristics of each producer are described in detail.

Large-scale producers

Most of large-scale producers are companies and located in the CHAVIMOCHIC project area. Staff members from two companies, both of which have their own processing plants, were interviewed. One company has 1,300 Ha of land, of which 350 Ha is currently used for asparagus production. The other owns 450 Ha, of which 150 Ha is used for asparagus. One of the important characteristics of these companies is the technology they utilize in production. There are two kinds of irrigation systems used for asparagus production. One is the simple gravity irrigation system (riego por gravedad) and the other is a sophisticated system utilizing pumps and pipes (riego tecnificado o riego por goteo). The simple irrigation system brings water from a canal to the plant by gravity.

Almost all of the companies in the CHAVIMOCHI project area use the sophisticated irrigation system, introduced from Israel and England. With this system pipes are installed in the fields, water from a canal is first held in a tank and distributed to the pipes from which drops of water irrigate the field little by little. In the most sophisticated system, the water is filtered and cleaned, and fertilizers are added. Then, the water is distributed to the fields through pumps controlled by a computer. The optimum amount of water and fertilizers are applied depending on the different growing stages of the plant. The advantage of the sophisticated system is that yield is very high, it requires less water, soil degradation is minimal, fewer weeds grow, etc. The yield of both companies interviewed reached 30 to 35 Mt/Ha per year, as much as three times the national average.

These companies have professional managers for administration, and agronomists for production. Manual laborers are not temporary, but permanent employees. Therefore, the overhead cost is high. According to the study by the local office of Ministry of Agriculture[58], in order to begin white asparagus production on a farm of 60 Ha with modern technology and administration, initial investment is US$ 543,000 (including purchase and preparation of land, installment of irrigation, machinery, etc.). In addition,

[58] Ministerio de Agricultura, Dirección Regional Agraria La Libertad, Oficina de Información Agraria (2000)

US$ 193,000 of working capital is required (inputs, labor, administration, etc.) before the first harvest in 18 months. With other miscellaneous expenses the total cost will be US$ 742,000 (US$ 13,000/Ha).
Both of the companies have their own processing plants with 50 to 70 Mt/day of processing capacity. One company obtains around 95% of raw material from its own farm. The person in charge of production claims that contracts with small-scale farmers are not feasible because they are not serious about fulfilling them. The other purchases 30 to 40% of asparagus from individual large and medium-scale farmers. It signs contracts with farmers fixing the price before the harvest. After the harvest, farmers wash, classify and cut asparagus to the same size before shipping it to the processing plants. This year, the company is paying US$ 0.4-0.5/Kg on an average for white asparagus. The price was US$ 1.10 about two years ago, but dropped to the current level because of competition in the international market, especially with the growing presence of Chinese products in European markets. According to the manager of this company, only large-scale farmers and companies can survive because modern asparagus production is becoming highly capital intensive. In addition, as the production of asparagus in the CHAVIMOCHIC project area increases and there is more raw material than the processing plants in the area can purchase, the standard of quality the plants demand from producers is becoming higher. They prefer to purchase high and uniform quality product from large and medium-scale farmers.
The companies are now looking for alternative crops other than asparagus. They cultivate artichoke and pepper (pimiento), and export preserved products. They are also experimenting with traditional crops such as sweet potato (camote) and sugar cane. With sophisticated irrigation systems, it is expected that the yield will be much higher than traditional production and will be profitable.

Medium-scale producers

The medium-scale farmers that were interviewed produce white asparagus on 20 to 35 Ha of land. They can be classified into two types of producers. One has similar characteristics to the large-scale producers. An owner of a 35 Ha farm had a poultry farming business and expanded to asparagus production. On his farm, which is located in the CHAVIMOCHI project area, a sophisticated irrigation system is used and the yield reaches 24 Mt/Ha. The necessary capital was acquired from a commercial bank. The difference from the large-scale producers is the scale of production and the farmer does not have his own processing plant. He is selling his product to a nearby processing plant without a contract for US$ 0.45/Kg this year.
The other classification covers producers originating as small-scale farmers. When the price of asparagus was high, until a few years ago, these producers accumulated capital and invested in land and agricultural machinery. Although their production practices are very similar to those of small-scale farmers, some of them started to introduce sophisticated irrigation systems.

Traditional small-scale producers

The small-scale farmers interviewed own four to 10 Ha of land situated in old valleys, where asparagus had been produced for a long time before the irrigation project. Some farmers obtained their land through the agricultural reforms in the 1970s. Common characteristics among small-scale farmers are: the use of family labor, use of simple irrigation system (riego por gravedad), low yield, inability to obtain formal credit, low farm-gate prices, etc.

Because there are few employment opportunities in the area, the cost of family labor is very low. Labor is hired on a temporary basis during certain periods of production such as harvest only. Simple irrigation does not require much additional investment because it is similar to the system used for any other crop. However, since it is difficult to control the precise amount of water in the same way as the sophisticated irrigation system, the yield is low compared with large-scale producers and is 6 to 13 Mt/Ha.

Non of these producers received credit from commercial banks. Some said that they borrowed from the state-subsidized agricultural bank during the 1980s, though after its closure at the beginning of the 1990s, there were no financial institutions offering credit to small-scale farmers. Other farmers said that if they had a sales contract with a processing plant, they could borrow money from a bank. However, they do not want to borrow money from a commercial bank because of the fear of losing their land if they default. They prefer to work with their own limited capital.

One farmer explained that he adapted some measures to save capital for production. Asparagus is a permanent crop, and it requires more capital for planting. Large-scale farmers buy imported certified seeds or crowns from nursery farms, but this farmer uses crowns taken from his own farms, whose quality is very low. In addition, when working capital is not available, he reduces the amount of fertilizer applied to the crop. As a consequence, yield is much lower than other types of producers, at 6 Mt/Ha. This is an example of the reaction of small-scale farmers to a lack of capital.

The buyers of produce vary from producer to producer. Some sell directly to processing plants and others sell to intermediaries. However, most of them sell their produce unclassified and do not transport to buyers. Farm-gate prices are very low compared with large and medium-scale producers. One producer with 3 Ha said that he sold his produce to an intermediary at S/. 0.35 – 0.45/Kg (US$ 0.10-0.13/Kg). The other producer had a price of $ 0.45/Kg, but because of the low quality of his produce, 20% was discounted. Some producers said that until a few years ago, there was more demand for asparagus than supply and intermediaries as well as buyers from processing plants came to the fields looking for raw material. Some of them paid in advance to ensure the supply, and others offered purchase contracts before the harvest and provided working capital. Farmers could choose the buyer who offered the better price. However in recent years, the supply of asparagus from medium and large-scale farms in the CHAVIMOCHI project area has increased, and processing plants do not come to small-scale farmers anymore. Only one intermediary comes to buy produce, and there is no room to negotiate price.

Unlike large-scale farmers, many small-scale farmers do not have precise figures about production. When asked about yield, they did not have exact figure, but some figures such as daily harvest and number of days harvested from the last harvest. The same applies to production cost. One farmer, who introduced a sophisticated irrigation system on an experimental basis, knew that the yield increased, but not by exactly how much.

Small-scale producers with support from NGOs.

Although these producers work the same areas of land as the traditional small-scale farmers described above, or even less, production and management of producers who receive help from NGOs are more modern. In Trujillo, there is an NGO called CTTU (Centro de Transferencia Tecnológica a Universitario: center for technology transfer to university graduates) founded in 1990 by a Jesuit father (Huamán 1999)[59]. The purpose of the organization is to help farmers develop their capacity to modernize production. It offers technical training for production of export crops, organizes producers and provides credit guarantees.

In one of its main programs, called UART (Unidades Agrícolas de Riego Tecnificado: agricultural unit with sophisticated irrigation), CTTU recruits university graduates who have not found jobs and are interested in becoming agricultural producers. After basic training for production, each member receives one hectare of land in the CHAVIMOCHIC project and US$ 12,000 – 15,000 of credit from a commercial bank, which CTTU guarantees with its fund. They invest in asparagus production using sophisticated irrigation systems. Production is carried out individually with frequent technical assistance from CTTU, but the members of UART as a group own and operate agricultural machinery, wells and pumps, and a collecting and sorting post in the field. CTTU also helps them to find buyers that offer better prices. The members pay a certain percentage of sales to CTTU as commission, and pay back their debt to the bank. When they pay back all debts, they become owners of their farms. From the start of the program in 1994, the first group of 12 members paid back all debts and "graduated" from the program. The group newly invested in the production of a further 70 Ha. About 60 people are currently in the UART program.

One of the producers who graduated from a local national university with an industrial engineering degree explained that he joined this program six years ago because he could not find any other job. His production yield reached 14 Mt/Ha, which is twice the national average. He finished paying back his debts after the third year of production. Although the sale price of asparagus has fallen 30% in the last two years, his production is still profitable. Unlike traditional small-scale farmers, the producers in the project understand the financial aspect of production. They have precise figures for interest rates, cost of production, yield per hectare, profit, etc., and they understand the importance of management. According to the coordinator of the project, one of the reasons that the NGO sets the size of initial production as one hectare is that it is small enough for one person to oversee all the aspects of production and management. Since the participants of the program are university educated and it is not difficult for them to understand the management aspect of production, it is possible to convert them into efficient producers with some training in agricultural production.

Another difference between traditional small-scale farmers and those who participate in the program is access to credit and organization. As described above, it is very difficult for individual farmers to have access to credit from commercial banks. Even if they could obtain it, the interest rate would be very high because banks see the agricultural sector as

[59] Information is also based on interviews with an CTTU staff and one of its producers on Nov. 30, 2000.

highly uncertain, and do not have much information about borrowers. That makes the probability of default very high. In the case of CTTU, its intermediation solves these problems. First, since the NGO provides fund to guarantee the debt payment, the bank is certain it will not lose its money. Secondly, the NGO has more information about the producers, and promotes and monitors their production, so the probability of default is low.
Another important role of CTTU is to organize producers. Investment in machinery, wells and pumps and a collecting and sorting post are too expensive for each producer if they invested individually, but becomes feasible when the cost is shared among several producers. Also, organizing is important when selling produce to processing plants. As a group, CTTU members can exercise their collective power as a medium-scale producer, and obtain favorable prices.

The purpose of this section was to demonstrate the characteristics of each type of white asparagus producer in the northern coastal area of Peru. In the next section, these characteristics are analyzed in the context of the participation of small-scale farmers in the production of agro-export crops.

Overcoming obstacles to small-scale producers

Until the middle of the 1990s, white asparagus production was attractive for small-scale farmers in the northern coastal area of Peru. The pioneers who invested in the production enjoyed high farm-gate prices because demand for raw material by processing plants was strong. Intermediaries and processing companies came down to farms to buy material. They did not care much about the quality of asparagus. Some of them offered inputs and working capital. Farmers could choose to whom they sold, based on price and other conditions.
However, the situation changed with the CHAVIMOCHI irrigation project. Through the project, large-scale agricultural land became available. Many agro-industry firms and large and medium-scale producers started capital intensive production on the newly acquired land. With sophisticated irrigation systems using pipes and professional agronomists in the field, these producers achieved very high yields – twice or three times than those of small-scale farmers – and high quality produce. As a consequence, the supply of white asparagus in the area increased. Processing plants demand higher quality standard than before, and pay lower prices for raw material. In addition, the growing presence of low-price Chinese products in the European market puts pressure on the prices of Peruvian products. Because small-scale farmers do not have the necessary capital to invest in yield and quality improvements, the profitability of asparagus production is deteriorating, and they will not be able to replace their plants in the future[60]. Here, the question is whether there is still room for small-scale farmers in the production of NTAEs like white asparagus.
Although large-scale agricultural land has become available through the irrigation project, most agro-industry firms depend on the supply of large amounts of raw material from third party producers because integrating production into their operation requires large amounts of capital. Besides, it seems that large-scale capital intensive production is not necessarily

[60] Asparagus is a permanent crop, and commercial production can last up to ten years. More capital is required for renewing the crops.

efficient in terms of cost and benefit. The analysis by IICA (2000) on Table 3 shows that in case of green asparagus, the yields of medium and large-scale producers are almost the same even though the cost is significantly higher for large-scale producers. In other words, additional investment for inputs and production technology significantly increases the yield of asparagus for small and medium-scale producers. However, for large-scale producers, additional investment does not improve the yield very much. In addition, economies of scale do not always work. For example, large-scale intensive production might exploit soil excessively and requires more fertilizer. Also, it can induce outbreaks of pests and disease. Therefore, there is a room for small-scale farmers to participate in NTAEs production. Their disadvantages, such as lack of access to credit, low quality produce and low farm-gate prices, can be overcome by modernizing production technology, management and organization. The additional investment in these three fields will significantly improve yield and efficiency. Modernization of production technology means introducing sophisticated irrigation systems, application of fertilizer and improving knowledge of crops. As far as knowledge is concerned, followers like small-scale farmers can obtain it from leaders like large-scale farmers at a relatively low cost. Modernization of management means formalizing property rights that can make access to credit possible, keeping track of costs and benefits to determine the optimum level of investment, respecting contracts and fulfilling them, etc. Organization means purchasing inputs and selling produce collectively to utilize economies of scale and to increase bargaining power.

Some of the existing studies emphasize the role of contracts in uniting traditional small-scale farmers with agro-industry firms. They argue that through contracts, small-scale farmers are able to participate in the production of NTAEs. However, there is a large gap between agro-industry firms and traditional small-scale farmers. NTAE production is highly sophisticated in many respects, and it is difficult for small-scale farmers who are not yet modernized to participate in production by themselves. Contracts alone cannot modernize farmers. However, it is possible to do so with help from NGOs. The case of a small-scale producer with support from an NGO described above is a successful example of how to overcome obstacles facing traditional small-scale producers.

Conclusion

In many countries in Latin America, exports of fresh fruits and vegetables, so called Non-Traditional Agricultural Exports (NTAEs) are increasing because of their comparative advantages: climate, geographical location, cheap labor, etc. Not only large-scale agro-industry firms, but also small-scale producers participated in the production of these crops and enjoyed profits. However, the easy phase of development of NTAE production did not last very long. As more producers become involved in these crops, the competition among them became fierce. When the price of the crops fell and the quality standards demanded by the agro-industry firms were raised, small-scale farmers, especially traditional family farmers, were not be able to compete with large-scale producers.

The purpose of this study is to see if small-scale producers can continue to participate in the production of NTAEs. Existing studies on theories in rural markets demonstrate that small-scale producers can participate in such production through contract farming with agro-industry firms. By linking with agro-industry firms, small-scale producers can obtain the necessary capital and technology and sell their products to the firms. However, asymmetry between firms and farmers lead to failed contracts. The gap between firms and farmers is

too big to be filled only with contract arrangements. The study on white asparagus production shows that small-scale producers can benefit by producing NTAEs with help from intermediary organizations such as NGOs, in such aspects as seeking finance, transferring technology, selling produce as a group. These organizations can help to modernize farmers and fill the gap between them and agro-industry firms.

However, the study is largely based on existing studies and a small number of interviews in the field. In order to demonstrate the feasibility of production by small-scale farmers with help from intermediary organizations, more cases of this nature need to be closely examined.

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